

## **Report on the Ordnance Removal Action, Divex Corp., Columbia, SC**

Jeffory L. Neece  
OEW Safety Specialist  
U.S. Army Engineer Division, Huntsville (USAEDH)  
Huntsville, Alabama

On 6 September 1993 Mr. Jack Sutherland, the owner of the Divex Corporation in Columbia, South Carolina was killed while manufacturing explosives. A Divex employee was injured in a second explosion, on 12 September, while cleaning out the building where the accident occurred. During the next several weeks, Local, State and Federal Law Enforcement Agencies removed and destroyed some of the hazardous materials. Large quantities of bulk explosives, military ordnance, munition components and hazardous chemicals were found. The facility was located seven miles north of Columbia, SC, on a 21 acre partial of land. This was a residential and small farm area of Richland County. Homes bordered the property on two sides and four families had to be relocated during the entire project. Mr. Sutherland was licensed to manufacture explosives, buy and sell explosives, transport and dispose of hazardous material.

By the middle of October the Environmental Protection Agencies (EPA), Region Four Emergency Response Branch, had taken control of the project and declared it a Superfund Site. The Bureau of Alcohol, Tobacco, and Firearms (BATF) and the 48th Ord Det (EOD) were called for assistance when military explosives and ordnance were found. Those two agencies conducted an inventory of the site for explosives and destroyed many of the most unstable ordnance and explosives found during this initial action.

On 1 November 1993 the EPA requested the U.S. Army Corps of Engineers, Huntsville Division (USAEDH), to provide assistance in the removal and destruction of the military ordnance and explosives found at the site. On 17 November, the EPA, BATF, and USAEDH met in Atlanta to formalize a support agreement and plan the cleanup. By the 29th of December USAEDH had requested support from the U.S. Army Defense Ammunition Center and School (USADACS) and issued a Delivery Order to UXB, Int., one of Huntsville's ordnance and explosive waste (OEW) contractors. UXB and USAEDH mobilized on 12 January to setup a work trailer and acquire needed equipment.

The EPA and its emergency response contractors had been working in a downtown lab owned by Mr. Sutherland. This office building had many bottles and lab packs of chemicals and explosives. Several bottles labeled nitroglycerin, lead azide, and lead styphnate were found and destroyed. ETI, Inc., OHM, Corp., the Coast Guard's Gulf Strike Team, BATF, the U.S. Army's 48th Ord Det (EOD) and various State and local agencies assisted the EPA during this phase of the cleanup.

Our entire team was mobilized and was ready to start operations on the 24th of January. Project Management was conducted from Huntsville by Mr. Roland Belew and for UXB by Mr. Gerald

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Kitzmilller in Virginia. On the 24th all personnel were briefed on site history and safety concerns, by the EPA's Site Safety Officer. Each of the team members read the Site Safety and Health Plan and were briefed on our mission and the tentative course of action. A total of 14 personnel were assembled for our removal action in Columbia.(1 ea. USAEDH, 3ea. USADACS, 10ea. UXB,Int.) Our response team consisted of the following agencies and principal personnel:

AGENCY	NAME	MAJOR RESPONSIBILITIES
USAEDH-	Mr.Jeff Neece-	EPA Liaison, Technical Coordinator, Safety
USADACS-	Mr.David Foulk-	Packaging, Shipping, Technical Data
UXB,Int-	Robert Diekman-	Senior UXO Supervisor

Initial information listed 14 trailers, buildings, or magazines that contained possible explosive items. Since BATF had conducted an inventory of all the areas at the site, our plan was to start a systematic clearing of each storage facility.

The following explosives items were listed in the initial inventory of the 14 storage areas:

- a.Various Artillery Fuzes  
(Approximately 13,000 )
- b.Bulk Explosives-TNT,HMX,RDX,OCTOL  
(Approximately 32,000 lbs)
- c.GEMSS and GATOR Antitank and Antipersonnel Landmines (Approximately 500 )
- d.Mine Components with Electric and Stab Detonators (Approximately 10,000)
- e.Percussion Primers  
( Approximately 3,000)
- f.Detonating Cord, Linear Shaped Charges  
( over 1000 feet)
- g.Electric and Nonelectric Blasting Caps,Hand Grenade Fuzes  
( Estimated 300-400)
- h.Safe and Arming Devices for Fuzes and Landmines  
(Approximately 10,000 )
- i.Propellent for 105mm Cartridges (Approximately 2800 lbs)

The EPA and it's chemical remedation contractors were already inventorying, overpacking, and

on-site treating the several hundred containers of hazardous chemicals. Additionally the site had in excess of one hundred unknown gas cylinders, that would require treatment. All of these actions would be conducted while we were processing our OEW items. Each morning a meeting was held by the EPA's On-Scene Coordinator to ensure all agencies knew what type of operations would be conducted that day. Our personnel were dressed in coveralls, gloves, five minute escape packs, and hardhats when needed. During certain chemical treatment operations we would be required to evacuate the exclusion zone .

During the processing of our first trailer we started finding boxes that were mislabeled. The outside of the boxes would have explosive "C" labels and would contain explosive "A" material. It is thought that this was the Divex Corporations way of passing State and Federal magazine storage requirements for explosives. During the investigation of the first trailer we discovered our first box of Gator Mines. These are small antipersonnel and antitank mines containing less than two pounds of explosive. Some have tripwires, some are antidisturbance and all had a self-destruct feature. David Foulk and Jeff Neece requested technical information from USAEDH and USADACS to formulate a plan. It was determined that the mines would be safe for local transport and disposal. The mines would be stored in a safe location until we were sure all had been recovered and then transported by BATF to Ft. Jackson for disposal by the 48th Ord Det (EOD).

During the first week USADACS, USAEDH, and BATF personnel started inquiring about a facility that could receive and destroy the explosive item recovered on the project. No commercial facility could be found that was permitted to conduct open detonation of our material. Some companies were operating furnaces that could process the small detonators that were being found , but none wanted to process the bulk explosives or artillery fuzes. Kansas Army Ammunition Plant (KAAP), a DOD facility operated by Day and Zimmerman Inc., indicated that they could arrange transport and disposal for all items, if they were shipped as hazardous material and not hazardous waste. Also they had a MOU with BATF to destroy explosives as a result Federal law enforcement activities. On 10 February 1994 a formal agreement was made between the Army Material Command, EPA, BATF and Corps of Engineers to allow the ultimate disposal at KAAP of the munitions recovered from the Divex Removal Action. The EPA's Federal On Scene Coordinator, Mr. Militcher, determined all ordnance items that were safe to ship, would be classified as hazardous material. During the same time period, an explosives manufacture was found who would take the majority of the bulk explosives. They sent trucks and removed 31,000 pounds of bulk explosives that would be destroyed or reprocessed for future sales.

During the second week we started losing several hours each day because of chemical treatment operations. We determined our personnel could not safely process explosive items in Level "B" protective clothing, which was required if you were in the exclusion zone during chemical treatment operations. A staff meeting was held by all project parties and a work plan modification was made. We would move our operations to the night, when adequate and safe lighting was installed. Our hours would be from 1630 to 0200. This would give us time to check

the area and stage materials for that night's processing, during daylight hours. Chemical operations would have to be completed each day prior to us moving into the exclusion zone. Before our personnel opened a trailer or building, the Coast Guard would conduct tests to determine if contamination had occurred from that day's chemical activities.

All storage facilities would be unloaded and brought to a processing table. At the processing station each container would be opened, part number or lot number recorded, condition determined, and a recommendation for off-site or on-site disposal. Then the items would be overpacked IAW DOT and DOD transportation requirements for shipment to KAAP.

Most of the material would require shipment in non-standard containers. Mr. Walt Holcomb, a team member from USADACS, teamed with UXB in the design and approval of wooden shipping boxes. These would be strapped on pallets, blocked and braced in the trucks for shipment. UXB set up a tent and built all the wooden containers required for shipping. This task kept two people occupied during the entire project.

During our third week of operations an explosion occurred during the daytime chemical operations. A contractor was using a trackhoe with grapples to remotely move drums from the building where the accident occurred. Two drums were in a rack on their sides. When the trackhoe operator grabbed one of the drums for movement a detonation occurred. One drum of cleaning solvent was thrown 30 feet in the air and out of the building. It landed upright and suffered no damage. None of the liquid inside was lost. The second drum was made of plastic and destroyed. A lab analysis was made of some residue in that location and determined to be lead styphnate. Mr. Sutherland was manufacturing lead styphnate the day he was killed and it must have been scattered all over the inside of the building during the explosion. Law enforcement reports stated that he accidentally poured pure sulfuric acid into water by mistake. The local fire department remotely flushed the building with several thousand gallons of water that evening.

During the next several evenings we continued our processing. Over 10,000 M-732 or M-557 artillery fuzes were processed. Some fuzes were damaged or had been taken apart, and were set aside for onsite disposal. Some had all explosive detonators removed and presented no hazard. Several thousand plastic body assemblies for the M-74 mine were packaged. Loose detonators for fuzes, mines, grenades were found. Electric safe and arming devices from mines and fuzes were also found and processed. One quart oil cans with melted Octol, paper bags with loose detonators, and plastic bottles filled with powdered explosives were some of the items found during processing. Very few of the original boxes were correctly labeled and processing personnel treated each box as an unknown. Nonsparking tools and a personnel grounding system was used. Many of these items could be detonated under the right conditions by static electricity.

One trailer contained 27 drums of propellant for 105mm artillery shells. This 2800 pounds of material had been in a trailer for a number of years without any temperature controls. Each drum was checked by the USADACS personnel for temperature. After several years propellant can

loose its stabilizer and become very sensitive. All drums were found to be within acceptable limits and processed for shipment. USADACS and KAAP recommended UXB place each 55 gallon steel drum in a metal overpack drum, fill it with a 50/50 solution of alcohol and water, brace the inside drum and seal each drum. The alcohol was to ensure no freezing took place during shipment. The drums would be loaded on a tractor trailer, blocked and braced for shipment. These 27 drums were shipped in a trailer with no other material.

On the 18th of February we shipped the last truck to KAAP. A total of four trailers of material were shipped to the Kansas Army Ammunition Plant for disposal. Most of the team was demobilized after equipment inventory, cleanup and turn-in was completed. Three UXB personnel and one CEHND representative would stay and conduct on-site disposal activities. Our operations would again be during daytime during this last phase of the project.

An underground storage tank found onsite was cut in half for burning operations. During the last eight days of our operations we conducted several open burns of powdered explosives, unstable detonators, and munition components that were unsafe for shipment. BAFT was conducting burns and onsite detonations at the safe time. They destroyed several items that were reactive chemicals and not explosives. Air samples were taken and no off-site contamination took place during any of the burns. UXB also conducted open detonation procedures on several ordnance items and some solid bulk explosives. These included a 2.75" rocket warhead, artillery fuzes, and the octol found in the oil cans.

The last operation to take place was a joint BATF, CEHND, and UXB disposal activity. During the first inventory conducted a on-site a reaction vessel was found outside on a table. The vessel contained lead styphnate crystals in an acid solution used in the making of the explosive. It was estimated to contain three or four pounds of crystals. All agencies contacted recommended disposal in place. This presented a problem because the vessel was less than 50 feet from the main building and unstable gas cylinders and chemicals were still on-site.

The solution we jointly arrived at was to try a foam suppression structure developed for use against homemade bombs during the late 1980's. A plywood structure 8 feet high x 12 feet long x 12 feet wide, would be placed around the table. An M-112 block of c-4 would be placed on the side of the vessel, covered by a cardboard box and remotely detonated. The structure would be remotely filled with fire fighting foam mixed at a 60 parts air to 1 part water. 1100 cubic feet of foam with a least four feet of foam on the top of the vessel was the guidance give to us by Sandia Labs,NM.

All trash and debris was removed and a dry run was conducted. Empty explosive magazines were placed in front of exposed gas cylinders and trailers containing unprocessed chemicals. The minimum amount of personnel were allowed on-site. Only UXO and BATF personnel were to conduct this operation. Medical, Fire, and hot line personnel were moved to a safe location and placed on standby. When the item was detonated all fragments were contained and only a small section of the plywood structure damaged. A three foot part of the plywood was blown off.

No damage from fragments or blast occurred to any outside building or storage trailer. A yellow residue from the liquid in the vessel stained the inside walls of the plywood structure. All plywood would be burned during chemical treatment procedures.

This completed our mission and left the EPA with no ordnance or explosive waste on-site. As of the last week in July 1994, the Divex cleanup operation was still in operation. The unknown gas cylinders had proven to be a difficult disposal operation. The emergency phase was expected to be completed in early August. The Divex Corporation cleanup has cost an estimated four million dollars through August 1994.

### **Conclusions**

Several lessons were learned during this emergency removal action. The primary one from an explosives safety standpoint, is that established DOD safety precautions for explosive operations should be followed. These will ensure hazardous operation can be conducted in a safe manner, without loss of life or damage to property. Also, hazardous chemical operations and explosive removal operations are not compatible. The project ran much smoother when operations were conducted at separate times. This project also proved that with cooperation and a well defined mission, multiple government agencies can work together. A good working relationship was maintained during the removal action. The EPA's coordinator was on-site at all times and technical issues or problems could be resolved at the project and did not require several days of offsite decision time. Agencies supporting emergency response actions should send personnel who are empowered to commit funds and have the experience make technical decisions.